

**TRISTAR MPPT™**

**SOLAR CONTROLLER WITH MAXIMUM POWER POINT TRACKING**

Morningstar's TriStar MPPT solar controller with TrakStar Technology™ is an advanced maximum power point tracking (MPPT) battery charger for off-grid photovoltaic (PV) systems up to 3kW. The controller provides the industry's highest peak efficiency of 99% and significantly less power loss compared to other MPPT controllers.

The TriStar MPPT features a smart tracking algorithm that maximizes the energy harvest from the PV by rapidly finding the solar array peak power point with extremely fast sweeping of the entire I-V curve. This product is the first PV controller to include on-board Ethernet for a fully web-enabled interface and includes up to 200 days of data logging.



30, 45 or 60 amps at up to 150 volts open circuit. Shown with optional meter.

**KEY FEATURES AND BENEFITS**

- **Maximizes Energy Harvest**  
Our TrakStar MPPT Technology features:
  - Better peak power point tracking than other MPPT controllers
  - Very fast sweeping of the entire I-V curve
  - Recognition of multiple power points during shading or mixed PV arrays
  - Excellent performance at sunrise and low solar insolation levels
- **Extremely High Reliability**
  - Robust thermal design and no cooling fans
  - Parallel circuit design provides less stress and longer life for electronic components
  - No mechanical relays
  - Extensive electronic protections including PV short circuit protection
  - Epoxy encapsulated inductors and conformally coated printed circuit boards
- **Very High Efficiency**
  - Peak efficiency of 99%
  - Proprietary tracking algorithm minimizes power losses
  - Low self-consumption
  - Continuous operation at full power to 45°C without need to de-rate
  - Selected electronic devices with higher ratings to minimize losses from heating

- **Extensive Networking and Communications Capabilities**  
Enables system monitoring, data logging and adjustability. Uses open standard MODBUS™ protocol and Morningstar's MS View software.
  - Meterbus: communications between compatible Morningstar products
  - Serial RS-232: connection to a personal computer
  - EIA-485: communications between multiple devices on a bus
  - Ethernet: fully web-enabled interface to a local network or internet; view from a web browser or send email/text messages
- **Metering and Data Logging**
  - Optional TriStar meter and remote meter provides detailed operating data, alarms and faults
  - Three LED's display system status
  - Up to 200 days of data logging via meters or communications ports

System Status:

53.60V	28C	54.2A
2867W		MPPT

Data Logging:

Today	Batt	Day: -1	Batt
	46.4 Vmin		47.2 Vmin
Today	Solar	Day: -1	Solar
	58.9 Amax		56.8 Amax
Today	Solar	Day: -1	Solar
	107.2 Vmax		105.5 Vmax

## TECHNICAL SPECIFICATIONS

### Electrical

	TS-MPPT-30	TS-MPPT-45	TS-MPPT-60
• Maximum Battery Current	30 amps	45 amps	60 amps
• Nominal Maximum Operating Power*			
12 Volt	400 Watts	600 Watts	800 Watts
24 Volt	800 Watts	1200 Watts	1600 Watts
48 Volt	1600 Watts	2400 Watts	3200 Watts

### TS-MPPT-30, 45 and 60

• Peak Efficiency	99%
• Nominal System Voltage	12, 24, 36 or 48 volts DC
• Maximum PV Open Circuit Voltage**	150 volts DC
• Battery Operating Voltage Range	8-72 volts DC
• Maximum Self-consumption	2.7 Watts
• Transient Surge Protection	4500 Watts/port

### Electronic Protections

- Solar: Overload, Short Circuit, High Voltage
- Battery: High Voltage
- High Temperature
- Lightning and Transient Surges
- Reverse Current at Night

### Battery Charging

• Charging algorithm	4-stage
• Charging stages	Bulk, Absorption, Float, Equalize
• Temperature Compensation	
Coefficient	-5mV/°C/cell (25° ref)
Range	-30°C to +80°C
Set Points	Absorption, Float, Equalize, HVD

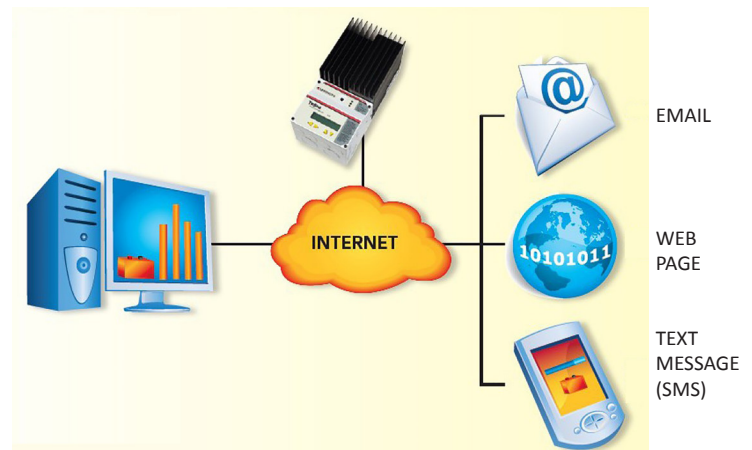
Note: Remote Temperature Sensor is included.

### Mechanical

• Dimensions	29.1 x 13.0 x 14.2 cm 11.4 x 5.1 x 5.6 in
• Weight	4.2 kg / 9.2 lbs
• Maximum Wire Size	35 mm <sup>2</sup> / 2 AWG
• Conduit knockouts	M20; ½, 1, 1 ¼ in
• Enclosure	Type 1 (indoor and vented) IP20

### Environmental

• Ambient Temperature	-40°C to +45°C
• Storage Temperature	-55°C to +100°C
• Humidity	100% non-condensing
• Tropicalization	Epoxy encapsulation Conformal coating Marine rated terminals



### Communication Ports

	TS-MPPT-30	TS-MPPT-45	TS-MPPT-60
• MeterBus	Yes	Yes	Yes
• RS-232	Yes	Yes	Yes
• EIA-485	No	No	Yes
• Ethernet	No	No	Yes

### Options

- TriStar Meter-2 (TS-M-2)
- TriStar Remote Meter-2 (TS-RM-2)
- Meter Hub (HUB-1)
- Relay Driver (RD-1)

### Certifications

- CE and RoHS Compliant
- ETL Listed (UL1741)
- cETL (CSA C22.2 No. 107.1-01)
- FCC Class B Part 15 Compliant
- U.S. National Electrical Code (NEC) 690.5 Compliant
- Manufactured in a certified ISO 9001 facility

\*Input power can exceed Nominal Maximum Operating Power, but controller will limit and provide its rated continuous maximum output current into batteries. This will not harm the controller (reminder: do not exceed Voc).

\*\*Exceeding Maximum PV Open Circuit Voltage may damage the controller.

WARRANTY: Five year warranty period. Contact Morningstar or your authorized distributor for complete terms.